

# **Lifestyle Changes that can help Control Hypertension**

Daniel T. Lackland

## Case 1

- A 42 year old man seen for a check-up, has blood pressure of 135/85 mmHg, with BMI of 29 and no symptoms. He reports occasional exercise and consumption of 4-5 beers per week. The exam and usual tests are normal.

## **Which of the following lifestyle interventions is the best strategy for management?**

- A] Weight loss
- B] Stress management
- C] Decreased alcohol intake
- D] Dietary supplement with potassium

## JNC 7: Management of Hypertension by BP Classification

BP Classification	Lifestyle Modification	Initial Drug Therapy	
		Without Compelling Indication	With Compelling Indication
<b>Normal</b> <b>&lt; 120/80 mm Hg</b>	<b>Encourage</b>		
<b>Pre-hypertension</b> <b>120-139/80-89 mm Hg</b>	<b>Yes</b>	<b>No drug indicated</b>	<b>Drug(s) for the compelling indications</b>
<b>Stage 1 hypertension</b> <b>140-159/90-99 mm Hg</b>	<b>Yes</b>	<b>Thiazide-type diuretics for most; may consider ACE-I, ARB, BB, CCB, or combination therapy as first line</b>	<b>Drug(s) for the compelling indications; other antihypertensive drugs (diuretics, ACE-I, ARB, BB, CCB) as needed</b>
<b>Stage 2 hypertension</b> <b>≥ 160/100 mm Hg</b>	<b>Yes</b>	<b>2-drug combination as first line for most (usually thiazide-type diuretic and ACE-I, ARB, BB, or CCB)</b>	<b>Drug(s) for the compelling indications; other antihypertensive drugs (diuretics, ACE-I, ARB, BB, CCB) as needed</b>

# Benefit of Lifestyle Modifications in Hypertension Management

## Bp Effect

**DASH Diet**

**8-14 mmHg**

**Weight Loss**

**10Kg- 5- 20mmHg**

**Low Sodium Diet**

**2-8 mmHg**

**Reduce Alcohol Intake**

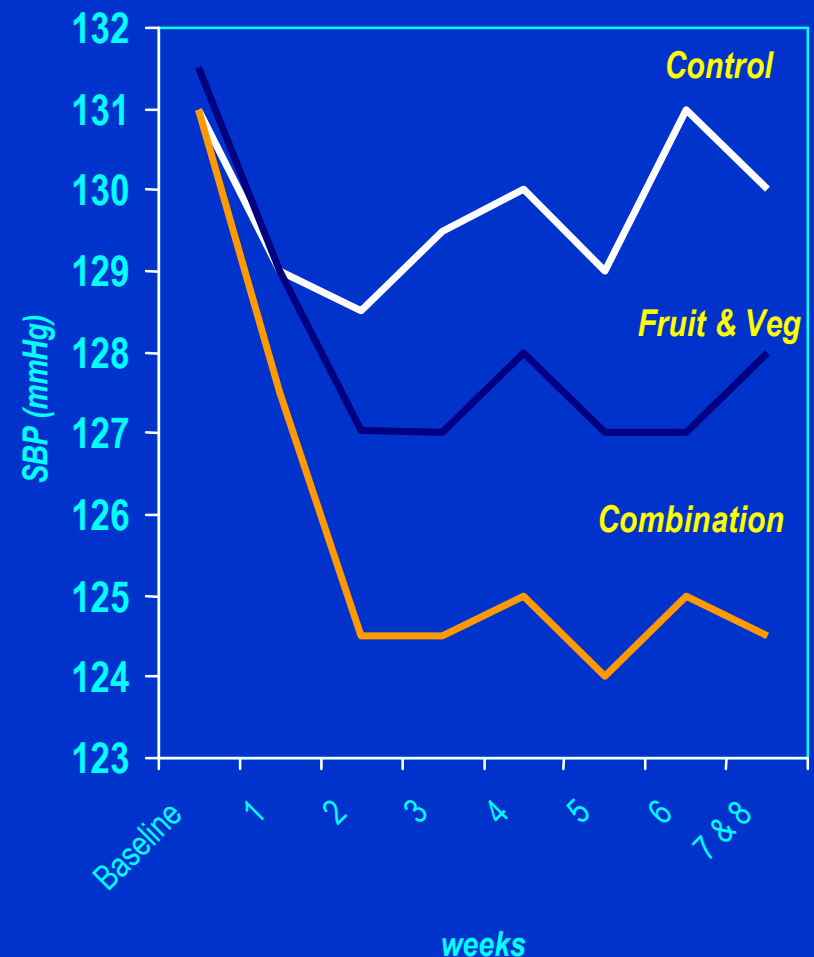
**2-4 mmHg**

**Regular Exercise**

**4-9 mmHg**

## D.A.S.H. diet

- High fruit & vegetables
- Low fat dairy products
- Whole grains & Nuts
- Poultry & Fish
- Little red meat, sweets, sugar-containing drinks
- Reduced total and saturated fat
- Reduced cholesterol



N Engl J Med 1997;336:1117-24

# Dietary Approaches to Stop Hypertension *The Dash Diet*

## 8 Weeks of DASH Diet

Systolic – 11.6 mmHg

Diastolic -5.3 mmHg

## DASH Diet

Fruit

Vegetables

Low Fat Foods

African Americans

## 8 Weeks DASH Diet

Systolic -13.2 mmHg

Diastolic - 6.1 mmHg

More Information: <[www.nhlbi.nih.gov](http://www.nhlbi.nih.gov)>

## **Trial Of Non-pharmacological intervention in the Elderly (TONE):**

weight (-3.5kg) and sodium (-40mmol/d) reductions in elderly patients (60-80 yrs)    BP reduction (-30%)

## **Diet, Exercise and Weight loss Intervention Trial (DEW-IT):**

DASH-diet + fitness program    -4.9kg and -12/-6mmHg



# Benefit of Lifestyle Modifications in Hypertension Management

## Bp Effect

**DASH Diet**

**8-14 mmHg**

**Weight Loss**

**10Kg- 5- 20mmHg**

**Low Sodium Diet**

**2-8 mmHg**

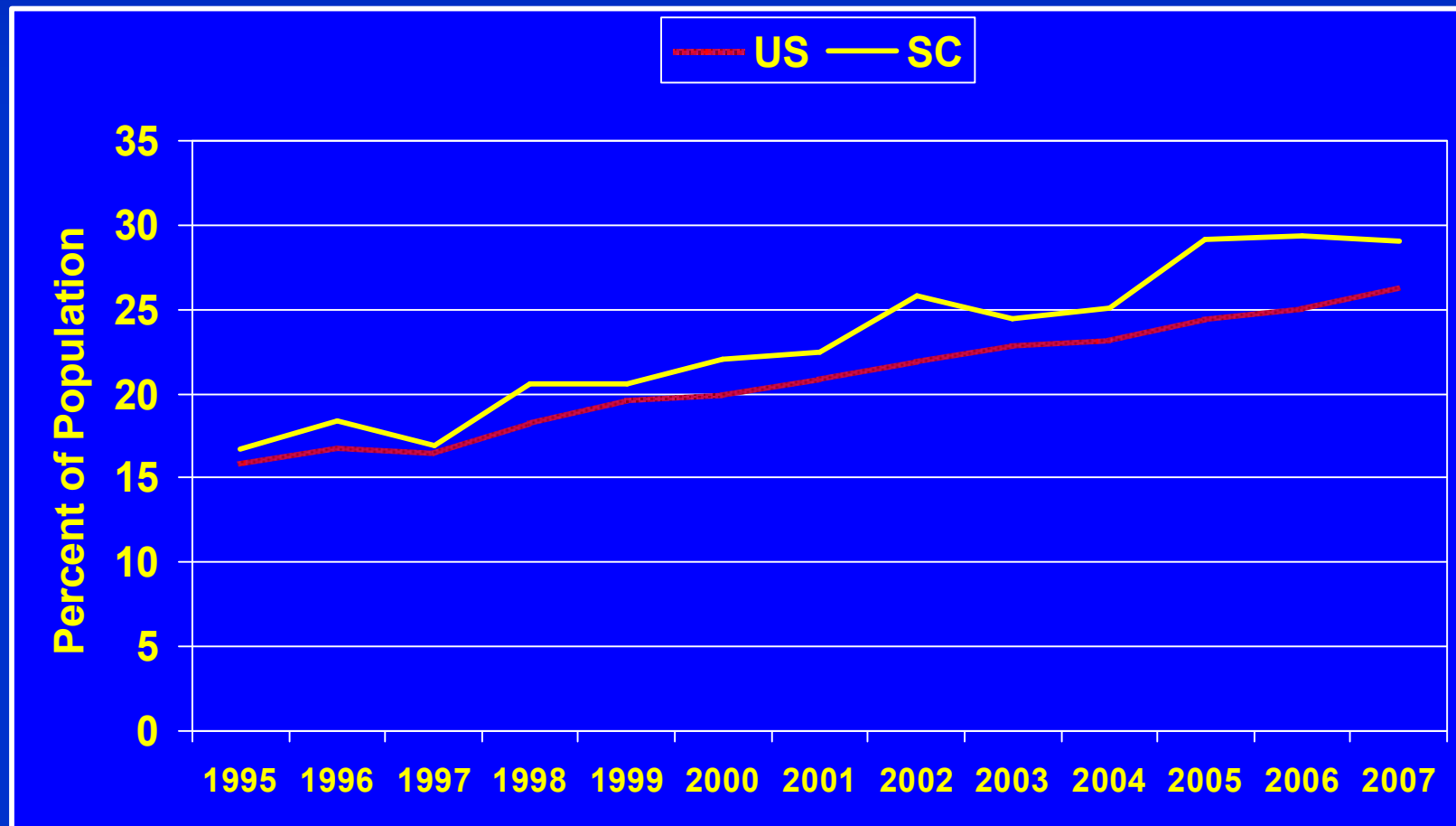
**Reduce Alcohol Intake**

**2-4 mmHg**

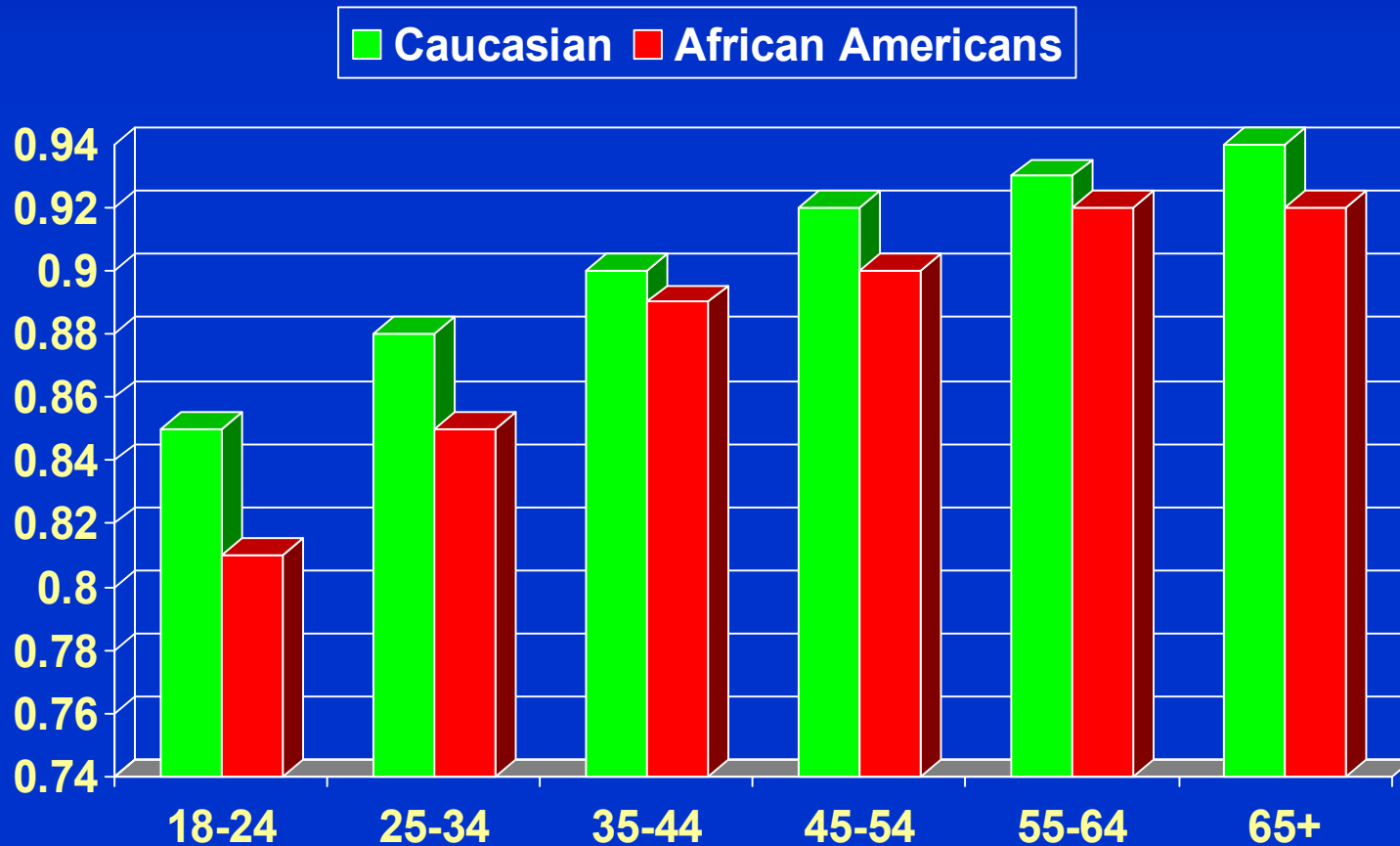
**Regular Exercise**

**4-9 mmHg**

# Obesity US and SC 2007



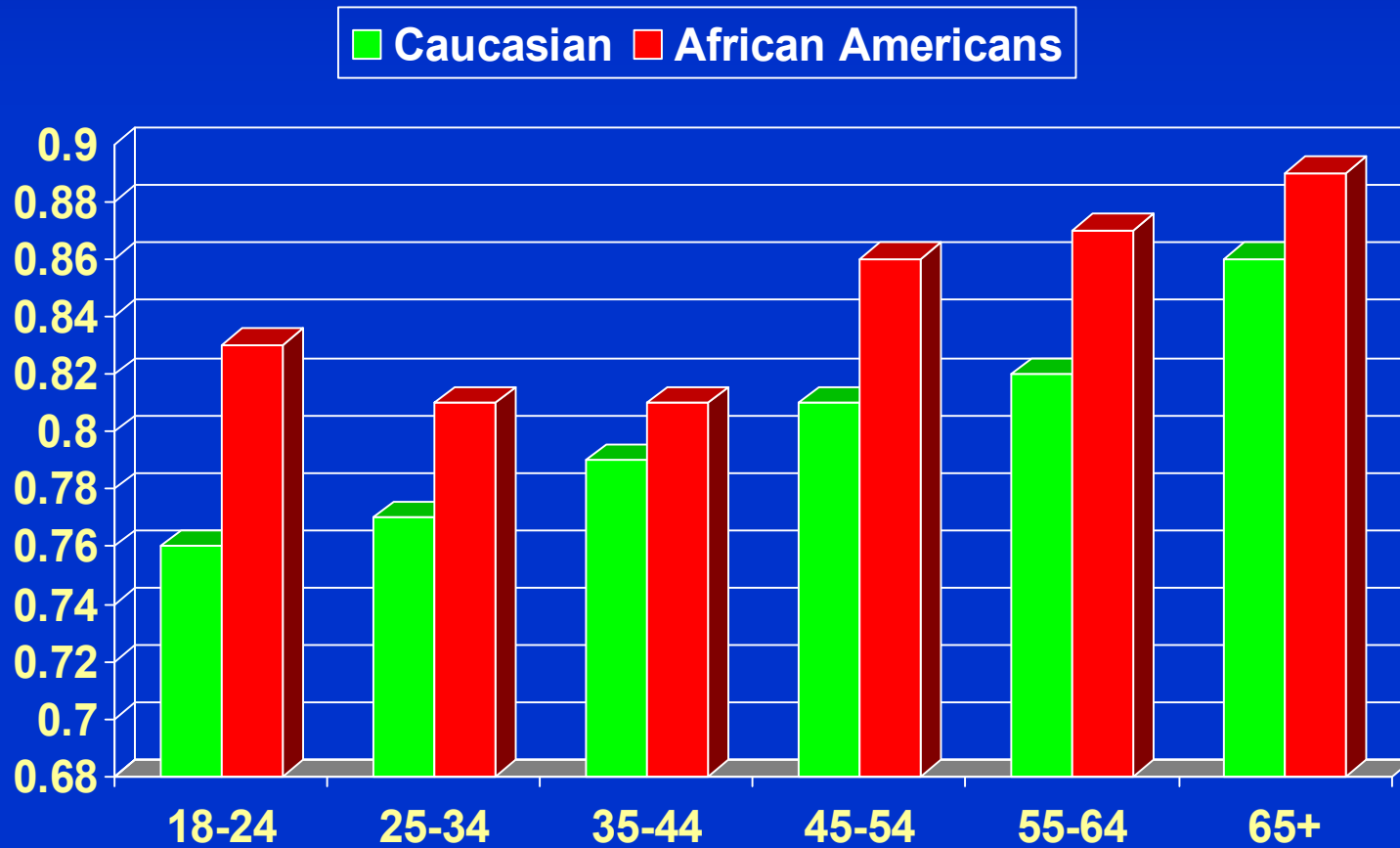
# Mean Waist to Hip Ratio Males [At-Risk WHR > .9]



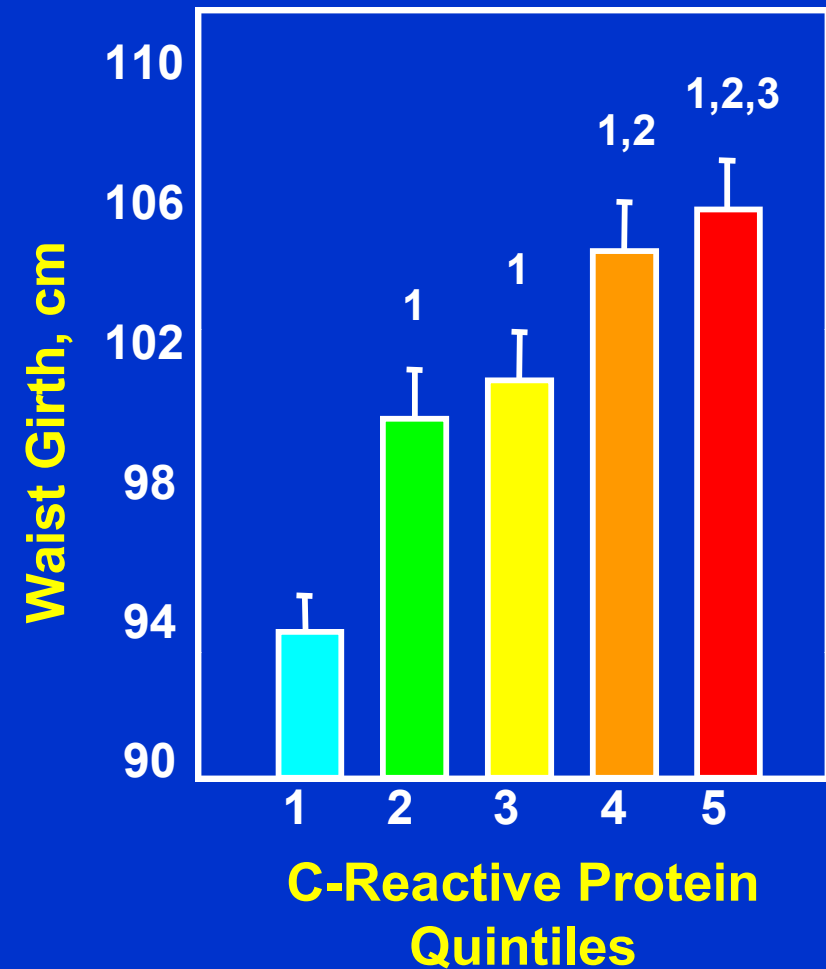
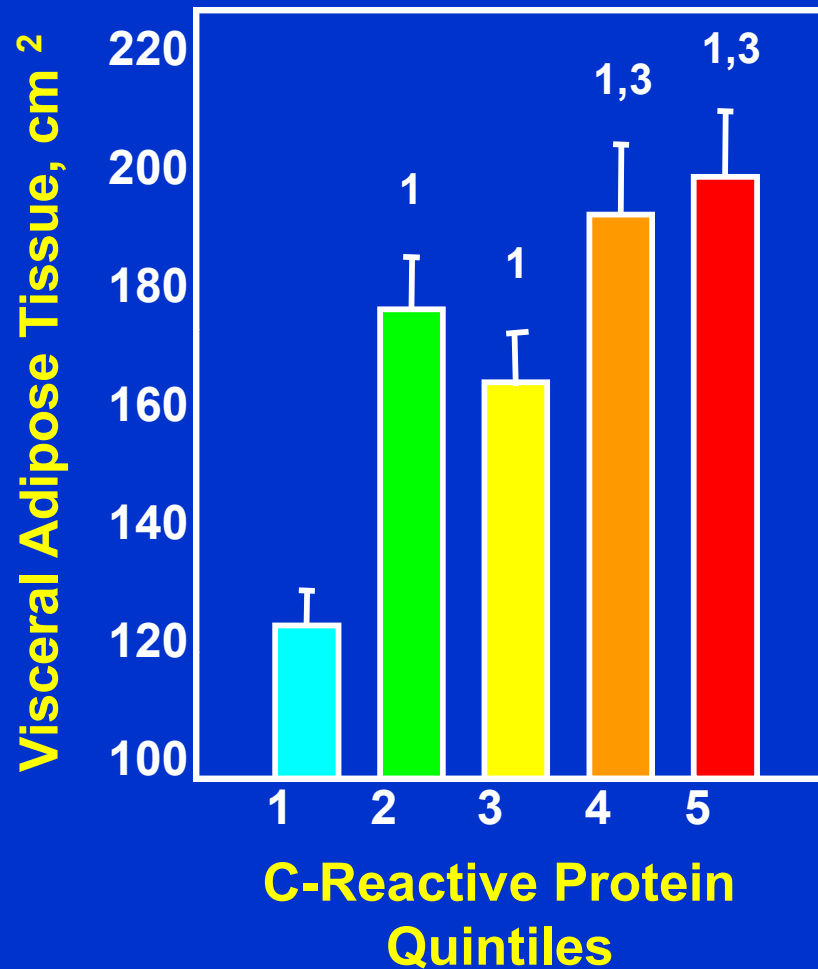
## Mean Waist to Hip Ratio

### Females

[At-Risk WHR > .85]



## Obesity Is Associated With Inflammation



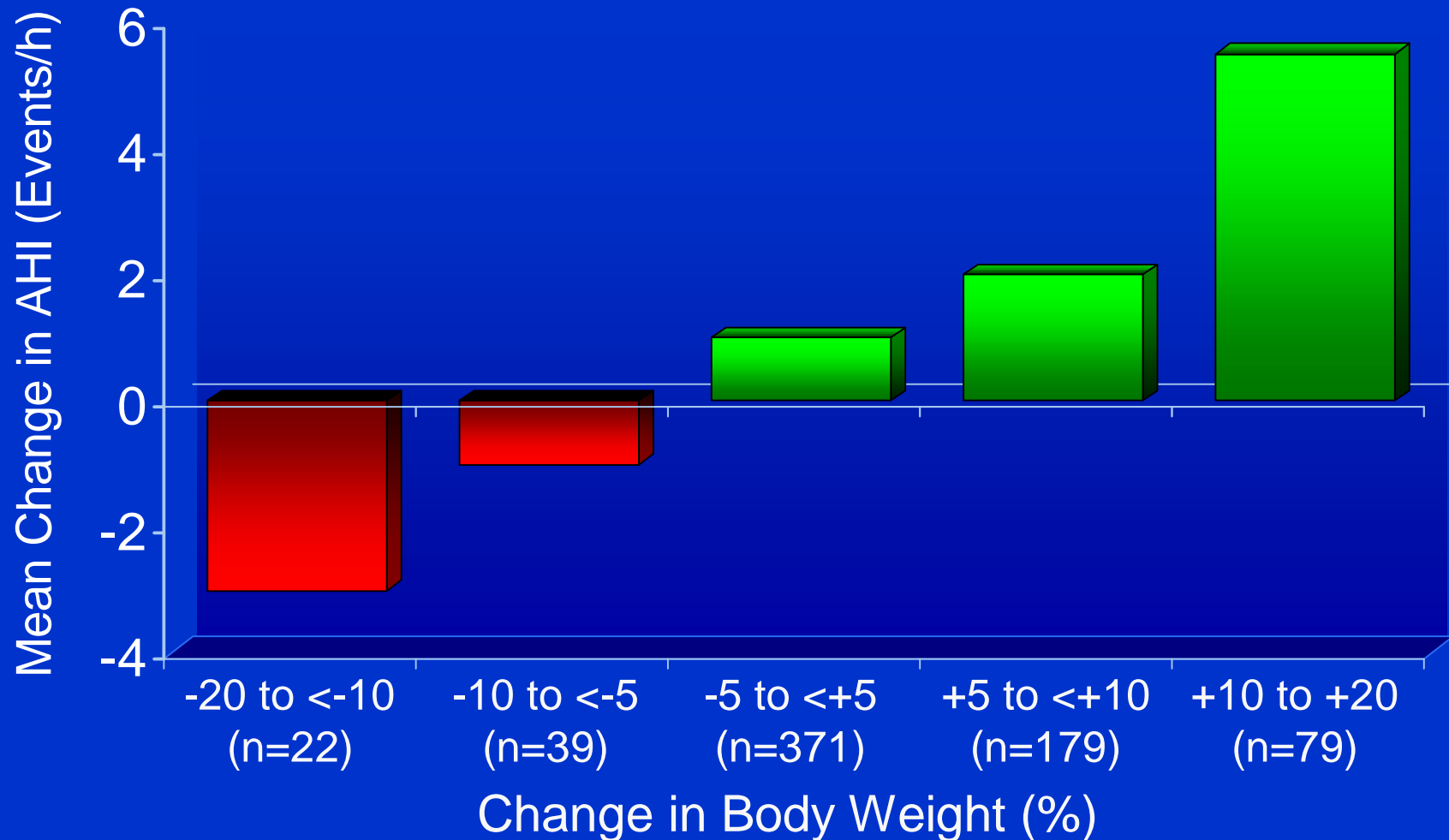
Lemieux I, et al. *Arterioscler Thromb Vasc Biol.* 2001;21:961-967.

# Impact of Weight Loss on Risk Factors

	~5% Weight Loss	5%-10% Weight Loss
HbA1c	 1	 1
Blood Pressure	 2	 2
Total Cholesterol	 3	 3
HDL Cholesterol	 3	 3
Triglycerides		 4

1. Wing RR et al. *Arch Intern Med.* 1987;147:1749-1753.
2. Mertens IL, Van Gaal LF. *Obes Res.* 2000;8:270-278.
3. Blackburn G. *Obes Res.* 1995;3 (Suppl 2):211S-216S.
4. Ditschuneit HH et al. *Eur J Clin Nutr.* 2002;56:264-270.

# Effect of Weight Change on Apnea-Hypopnea Index (AHI)



Peppard et al. *JAMA* 2000;284:3015.

## **Weight Change and Risks of Diabetes and Metabolic Syndrome**

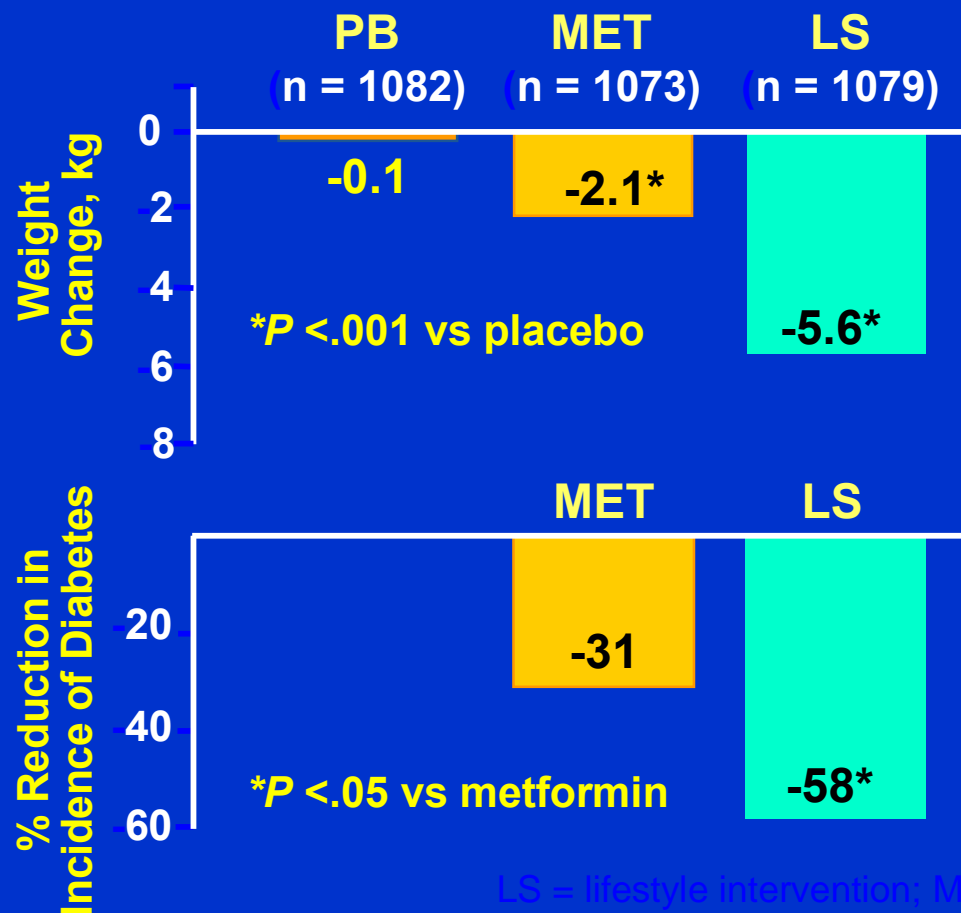
- A 5.6 % reduction in weight was associated with a 58% reduced risk of diabetes.
- A 5.6 % reduction in weight was associated with a 41% reduced risk of metabolic syndrome.

Knowler WM, et.al. Diabetes Prevention Program. NEJM 2002;346:393-403;  
Orchard TJ, et.al. Diabetes Prevention Program. Ann Intern Med 2005; 142:611-619

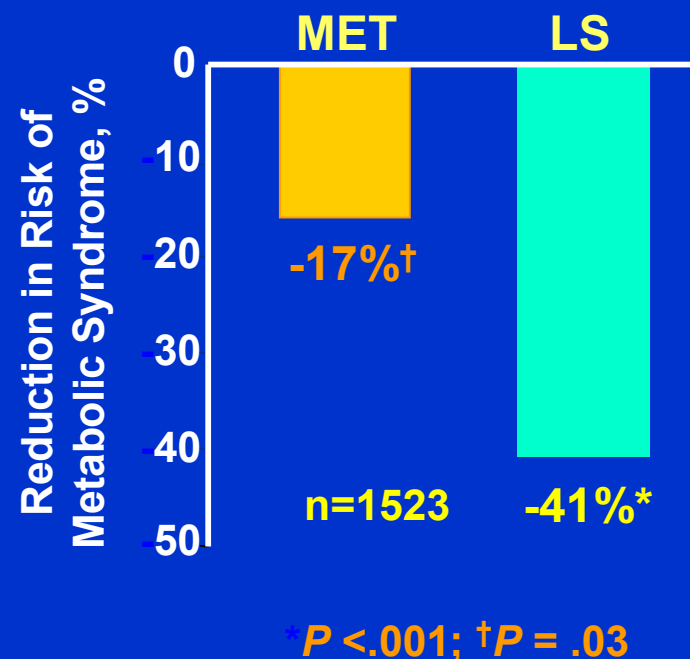


# Effect of Interventions on Weight Change and Risk of Diabetes and Metabolic Syndrome

## Diabetes Prevention Program



## Risk of developing metabolic syndrome



LS = lifestyle intervention; MET = metformin; PB = placebo

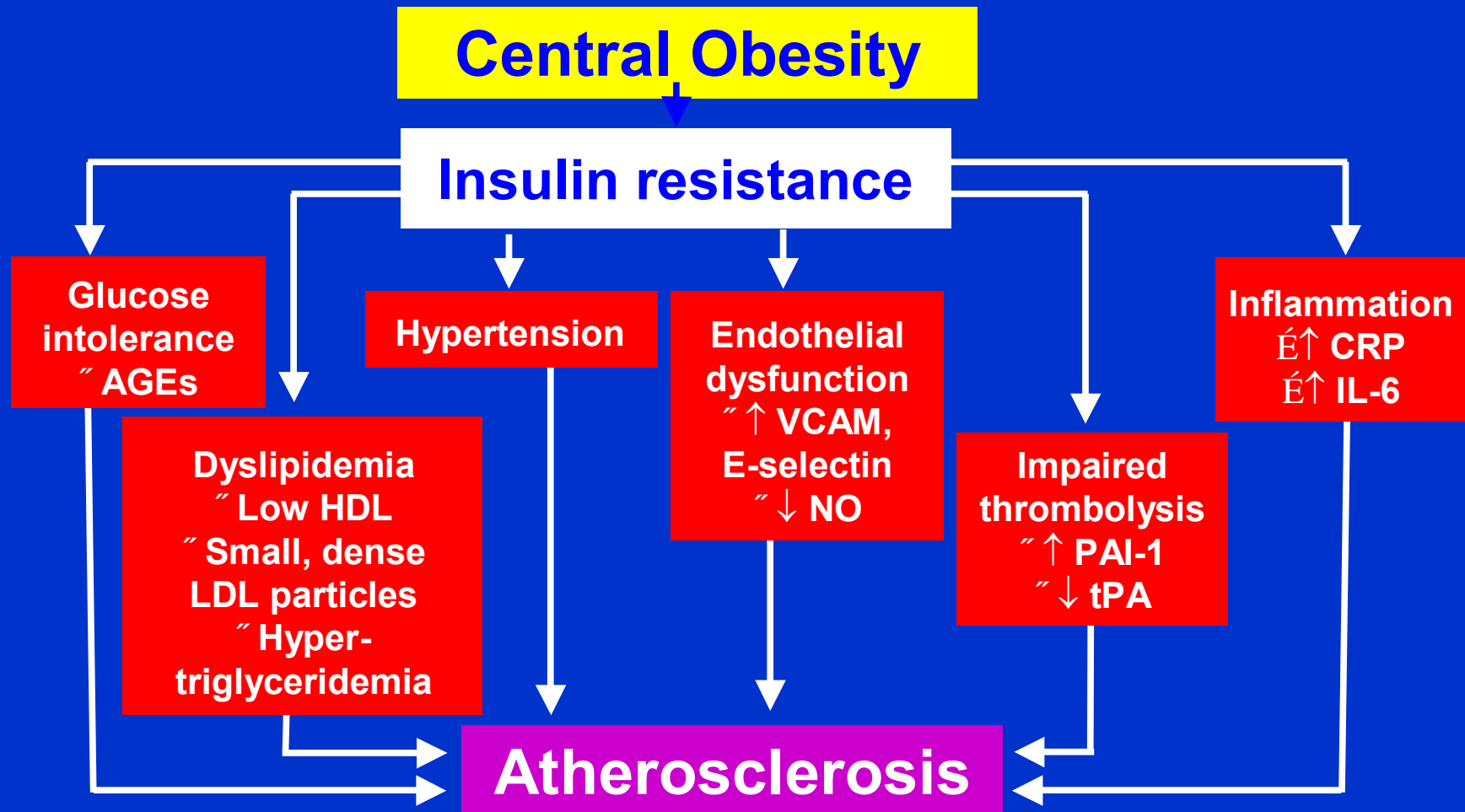
Knowler WM, et al; Diabetes Prevention Program Research Group. *N Engl J Med.* 2002;346:393-403.

Orchard TJ, et al; Diabetes Prevention Program Research Group. *Ann Intern Med.* 2005;142:611-619.

**The best predictor of metabolic disorders is**

- A] BMI**
- B] Waist Circumference**
- C] 3-D imaging**
- D] Total surface area**

# Association of Insulin Resistance With Cardiovascular Risk Factors and Atherosclerosis



# Measurement of Waist Circumference



Place a measuring tape, held parallel to the floor, around the patient's abdomen at the level of the iliac crest

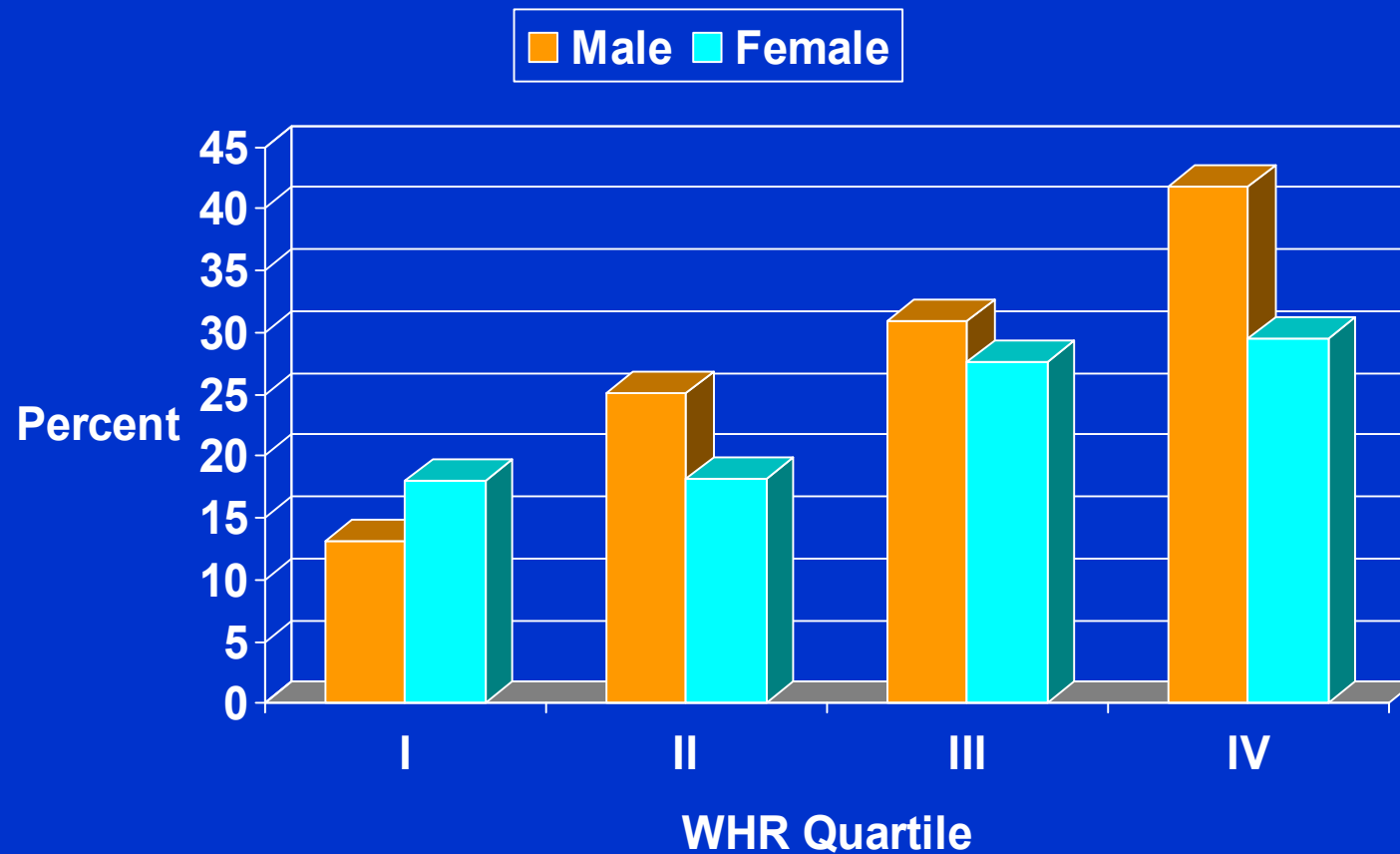
The tape should fit snugly around the waist without compressing the skin

Take the measurement at the end of a normal expiration

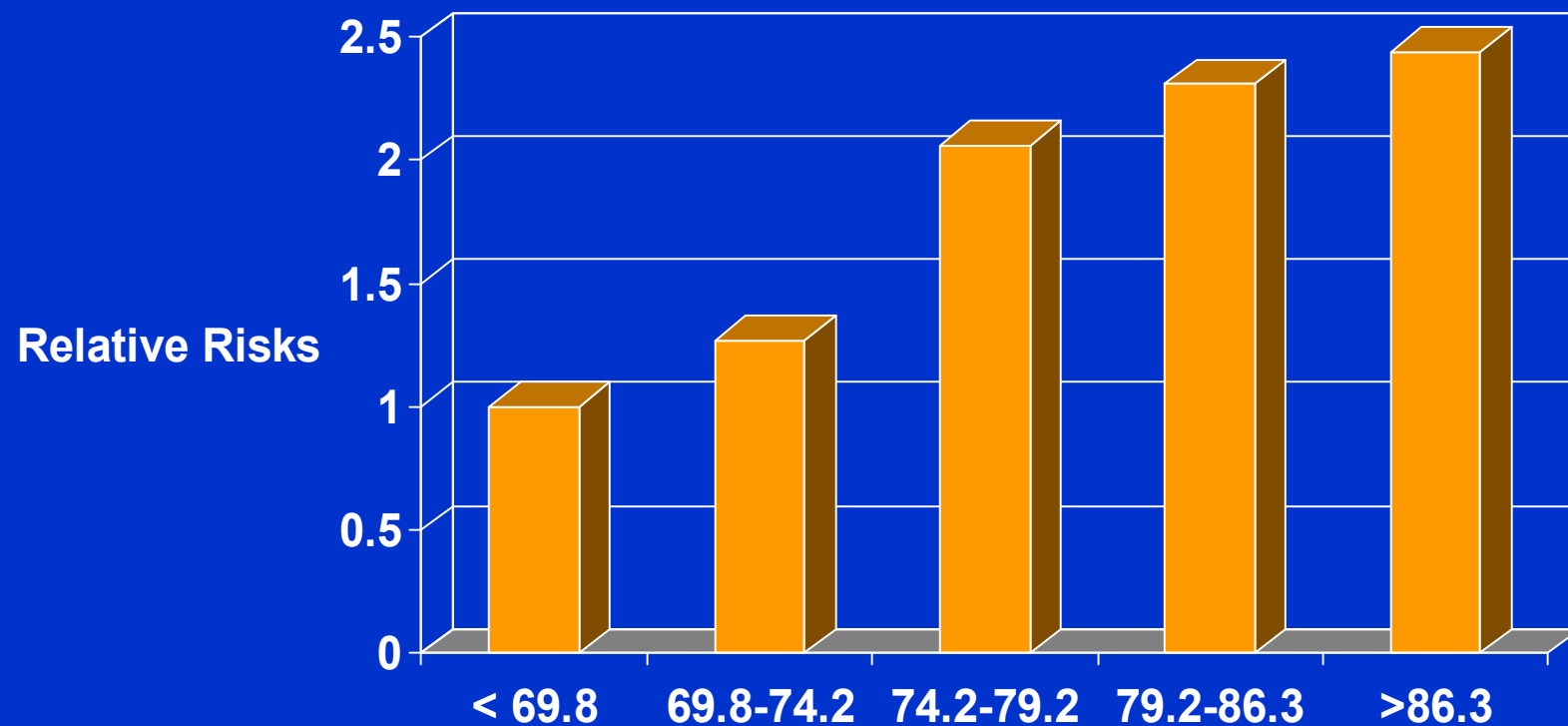
A waist circumference of  $\sim 40$  inches in men or  $\sim 35$  inches in women is diagnostic of abdominal obesity and suggests the presence of other cardiometabolic risk factors.

Adapted from Grundy SM, et al. *Circulation*. 2005;112:2735-2752.

## Age-Adjusted Prevalence of hypertension by Waist-Hip Ratio



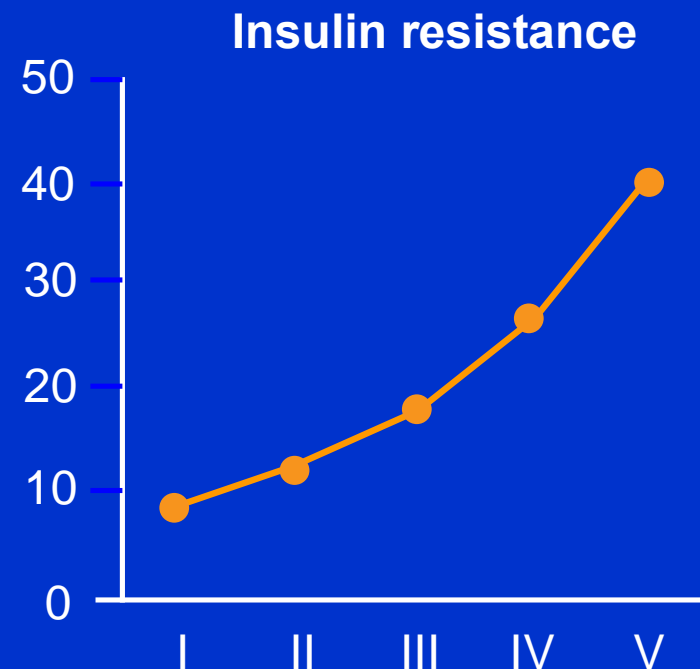
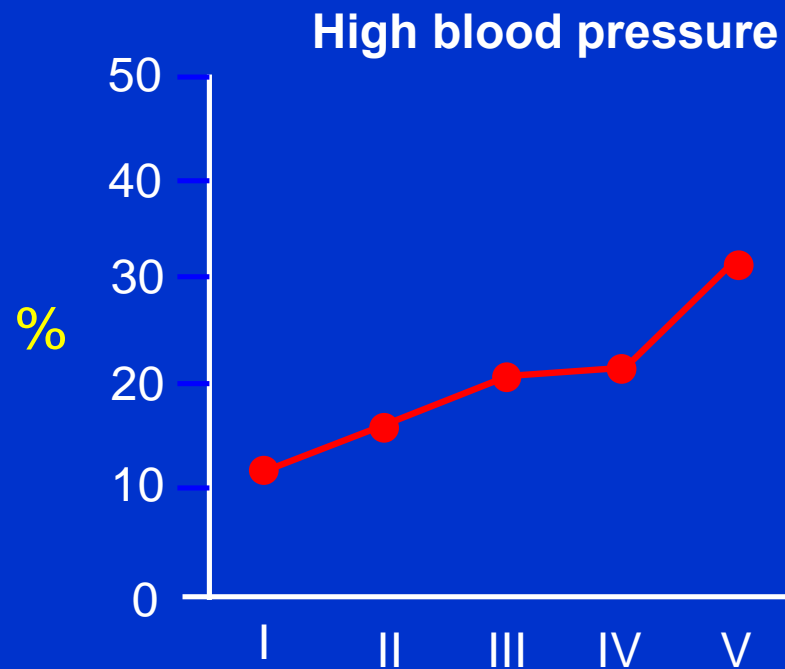
# Relative Risks for Coronary Heart Disease by Waist Circumference



Rexrode KM, et.al JAMA 1998;280:1843-1848

# Waist Circumference Correlates With BP and Insulin Resistance

768 men with fasting glucose  $\leq 126$  mg/dL ( $\leq 7$  mmol/L)



**Quintiles of Waist Circumference**

**$P < .001$  for trend in each parameter.**

Siani A, et al. *Am J Hypertens*. 2002;15:780-786.

## Impact on Care

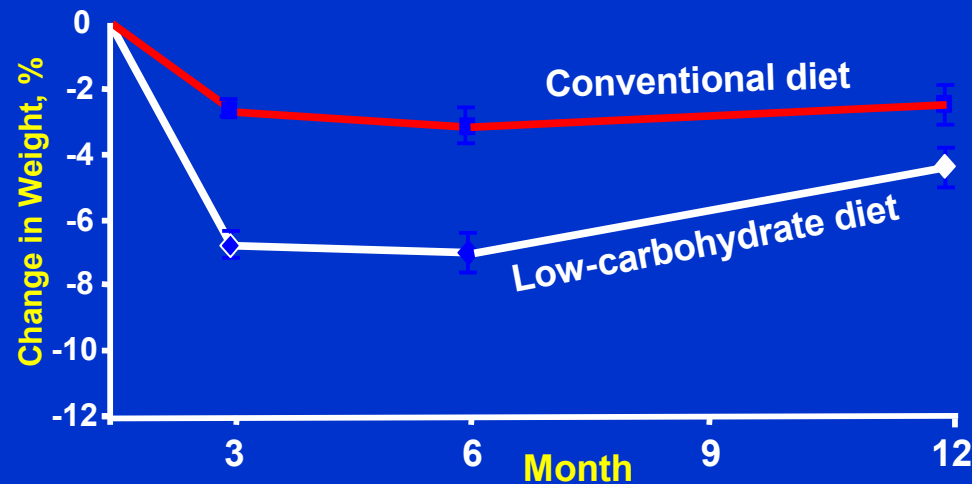
- Obese patients are less likely to obtain
  - Preventive health services and exams
  - Cancer screens, pelvic exams, mammograms
- and are more likely to
  - Cancel appointments
  - Delay appointments

Adams et al., 1993; Drury & Louis, 2002; Fontaine et al., 1998; Olson et al., 1994, Ostbye et al., 2005

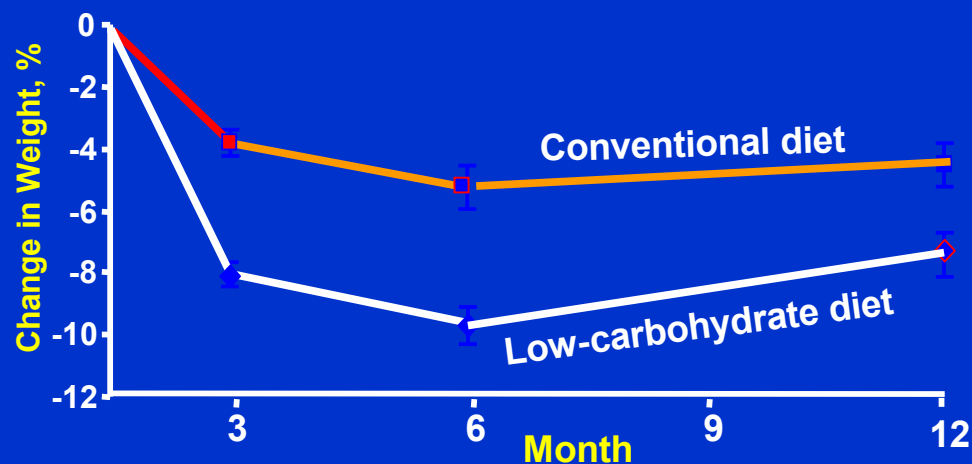


# Comparison of Effects of Low-Carbohydrate and Conventional Diets

## Baseline Values Carried Forward



## Complete Data or Data From Last Visit



- Weight loss from low-carbohydrate diet not sustained at 1 year
- Poor adherence and high attrition both with low-carbohydrate and conventional (low-calorie, high-carbohydrate) diet
- Other studies show 75%-121% of weight is regained over time\*

\*Glazer G. *Ann Intern Med.* 2001;161:1814-1824.

# Benefit of Lifestyle Modifications in Hypertension Management

## Bp Effect

**DASH Diet**

**8-14 mmHg**

**Weight Loss**

**10Kg- 5- 20mmHg**

**Low Sodium Diet**

**2-8 mmHg**

**Reduce Alcohol Intake**

**2-4 mmHg**

**Regular Exercise**

**4-9 mmHg**

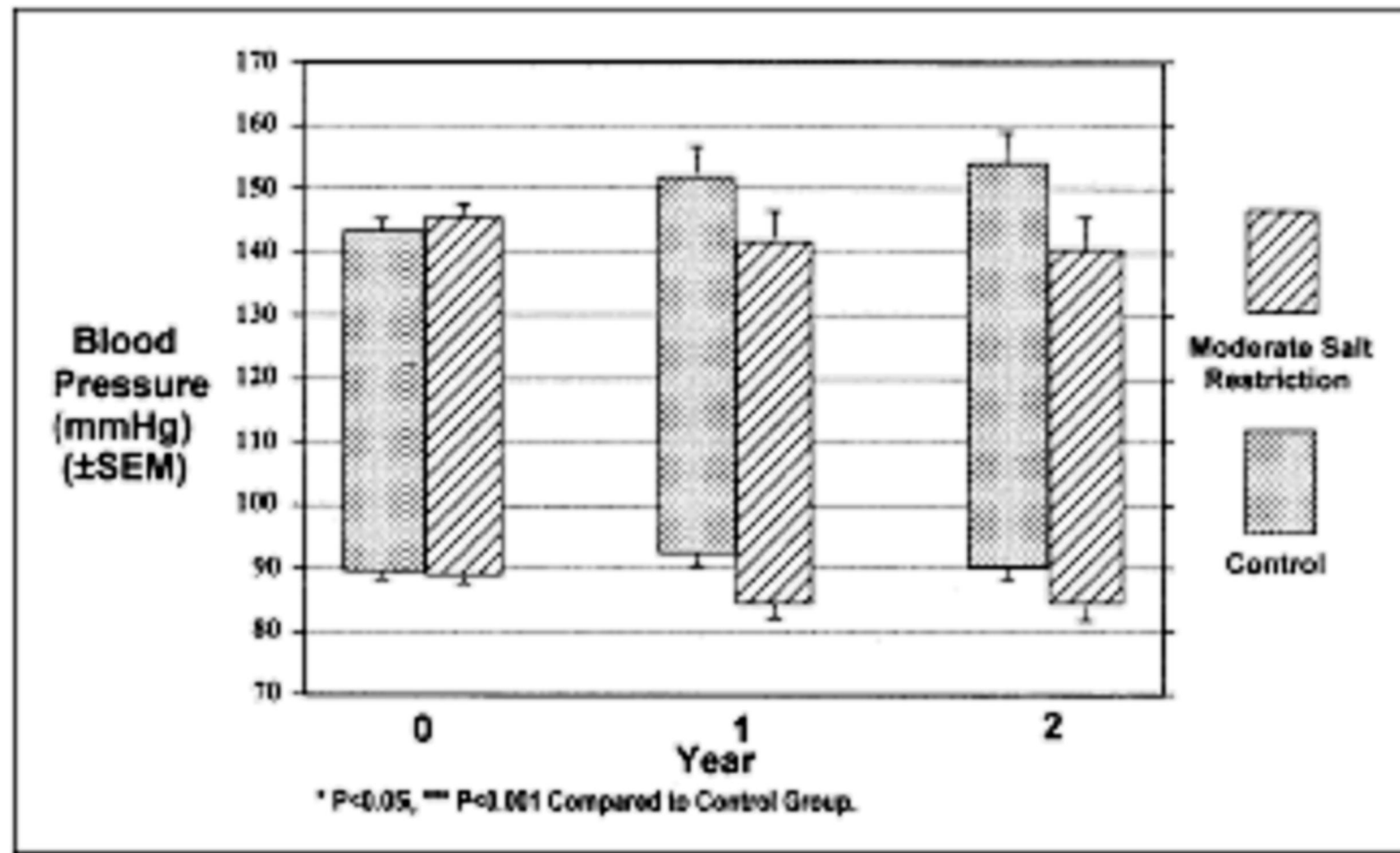
# Sodium and Potassium

# Sodium and cardiovascular disease

- Prospective follow-up of 2400 Finnish men and women
- 100 mmol/d higher sodium excretion associated with 45% increase in cardiovascular death and 26% in all-cause mortality

Tuomilehto, Lancet 357:848, 2001

**Figure 5. Blood pressure changes in two Portuguese villages**



**Forte-J Human Hypertension 1989**

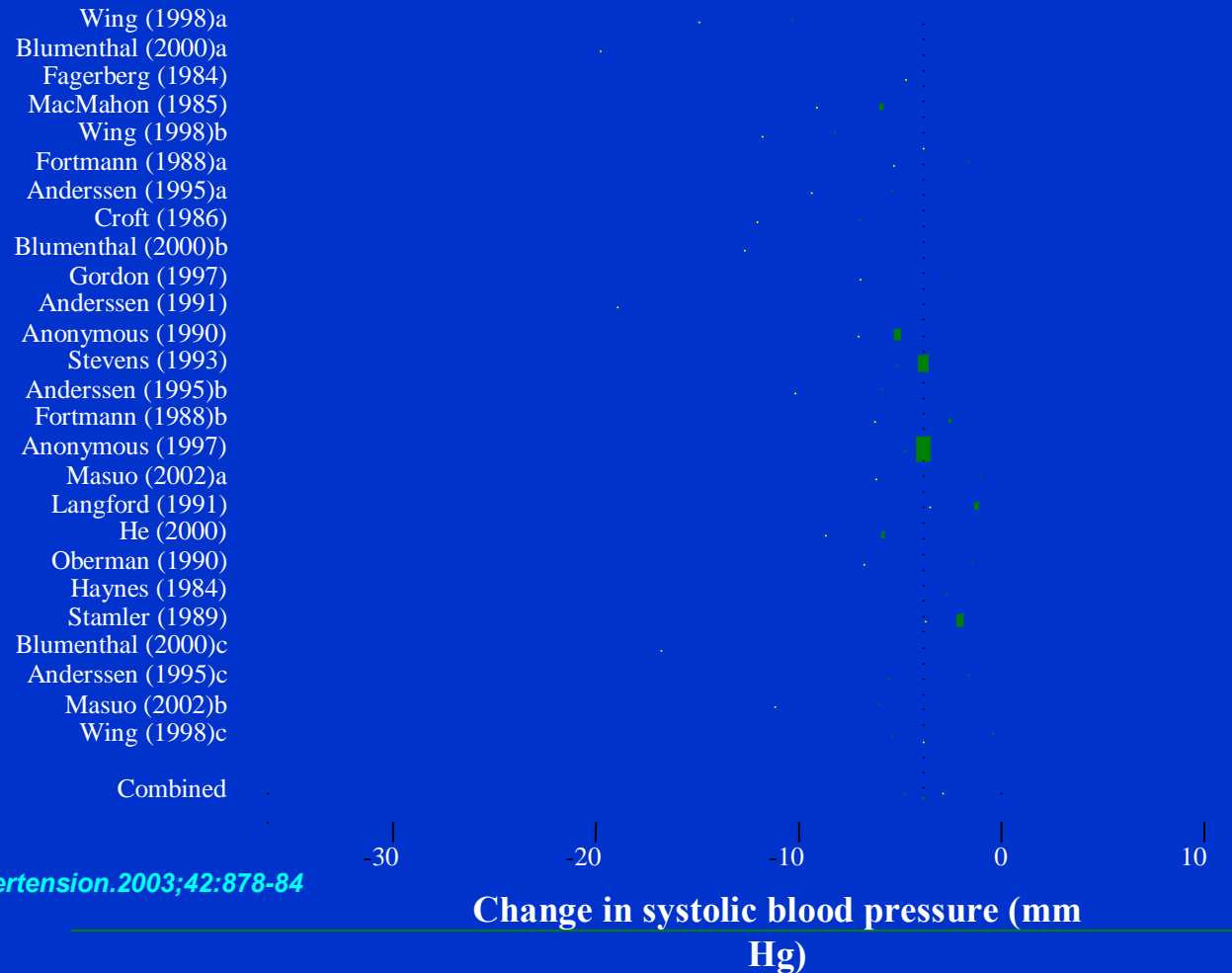
**F**

# Sodium Intervention

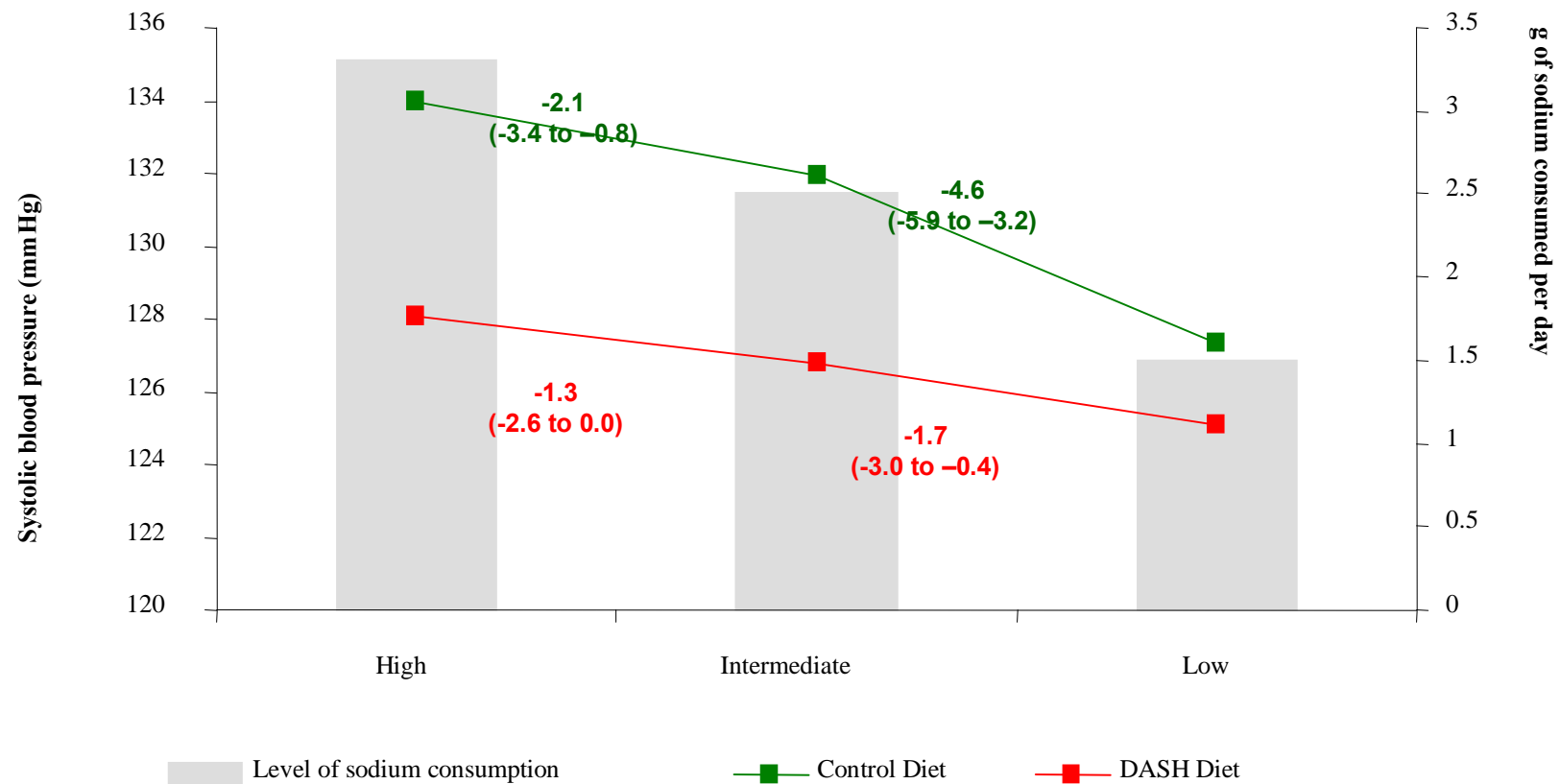
- $\frac{3}{4}$  of the dietary sodium intake is due to processed foods

# Systolic blood pressure change in randomized controlled trials of weight reduction in function of whether or not the patients follow an antihypertensive treatment.

## Untreated patients



# Systolic blood pressure reduction following the DASH diet and a reduction of salt intake



The reduction in salt consumption is a valuable non pharmacological measure to reduce blood pressure; its combination with the DASH diet is additive.



# Mean net changes in SBP and DBP

Variable	Systolic Blood Pressure			Diastolic Blood Pressure		
	Trials Examined	Net Change (95% CI)	P Value	Trials Examined	Net Change (95% CI)	P Value
	<i>n</i>	<i>mm Hg</i>		<i>n</i>	<i>mm Hg</i>	
All trials	53	-3.84 (-4.97 to -2.72)	<0.001	50	-2.58 (-3.35 to -1.81)	<0.001
Exercise supervised*	45	-4.13 (-5.21 to -3.05)	<0.001	42	-2.68 (-3.55 to -1.81)	<0.001
Antihypertensive medication not administered†	49	-4.23 (-5.42 to -3.05)	<0.001	46	-2.91 (-3.69 to -2.13)	<0.001
Single intervention between groups‡	47	-4.39 (-5.68 to -3.10)	<0.001	44	-2.97 (-3.82 to -2.12)	<0.001
Blood pressure as primary outcome§	37	-4.39 (-5.93 to -2.86)	<0.001	36	-2.87 (-3.91 to -1.84)	<0.001

Whelton SP et al. *Ann Int Med* 2002;136:493-503

# Benefit of Lifestyle Modifications in Hypertension Management

## Bp Effect

**DASH Diet**

**8-14 mmHg**

**Weight Loss**

**10Kg- 5- 20mmHg**

**Low Sodium Diet**

**2-8 mmHg**

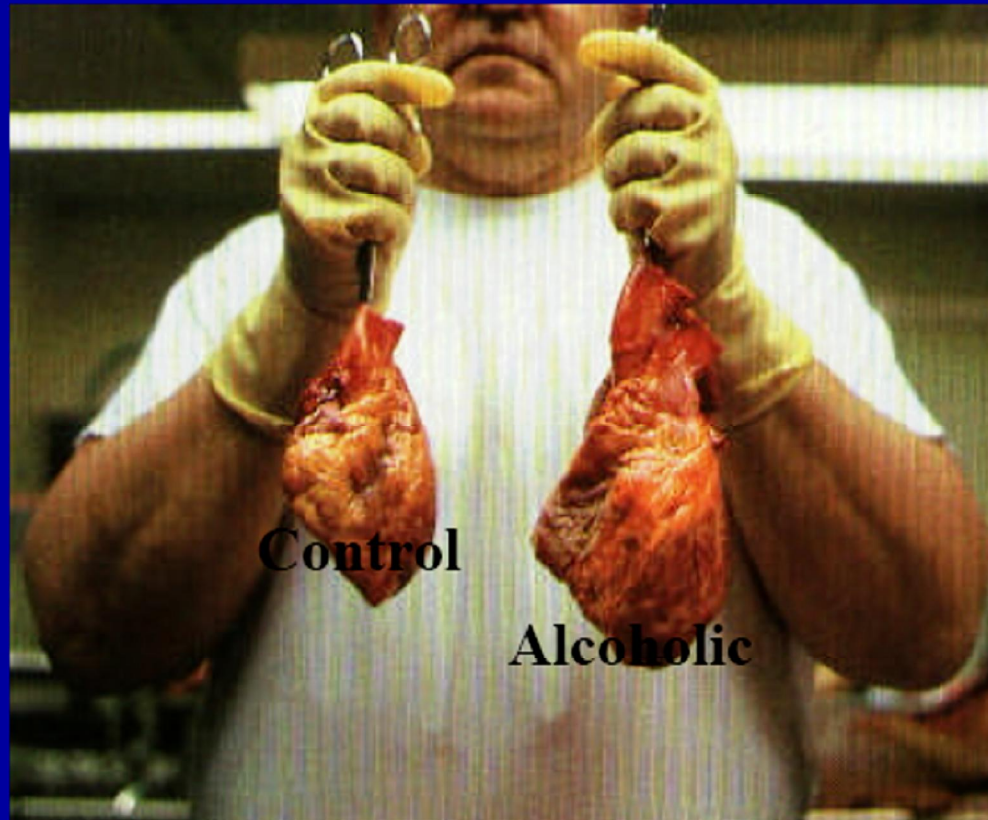
**Reduce Alcohol Intake**

**2-4 mmHg**

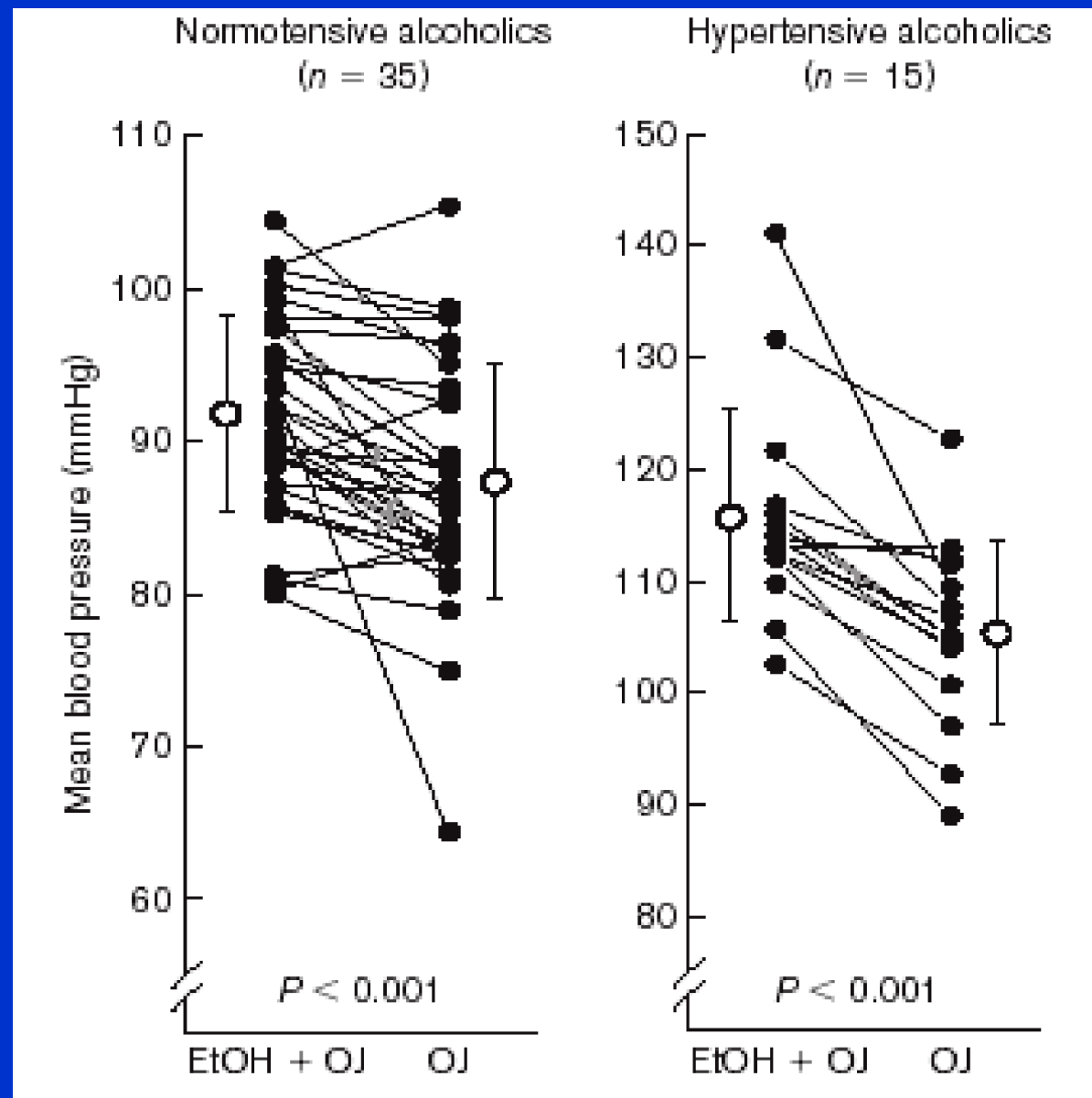
**Regular Exercise**

**4-9 mmHg**

# Alcoholic Cardiomyopathy



Picture Modified from National Geographic, 181:14, 1992

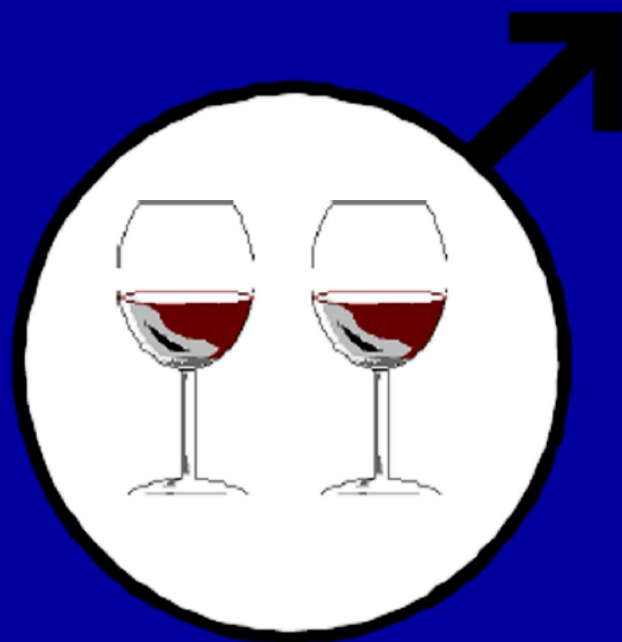


**Estruch, 2005**

## In consideration of alcohol intake for health

- A] Red wine (1-2 glasses)
- B] Spirits (1 shot per day)
- C] Beer (it is not a coincidence that there are 24 hours in a day and 24 cans in a case)
- D] any wine (3 glasses per day)
- E] One glass of wine every 12 hours

## Moderate Drinking



One Drink = 12 ounces of beer  
5 ounces of wine, or  
1.5 ounces of 80-proof distilled spirits

# Benefit of Lifestyle Modifications in Hypertension Management

## Bp Effect

**DASH Diet**

**8-14 mmHg**

**Weight Loss**

**10Kg- 5- 20mmHg**

**Low Sodium Diet**

**2-8 mmHg**

**Reduce Alcohol Intake**

**2-4 mmHg**

**Regular Exercise**

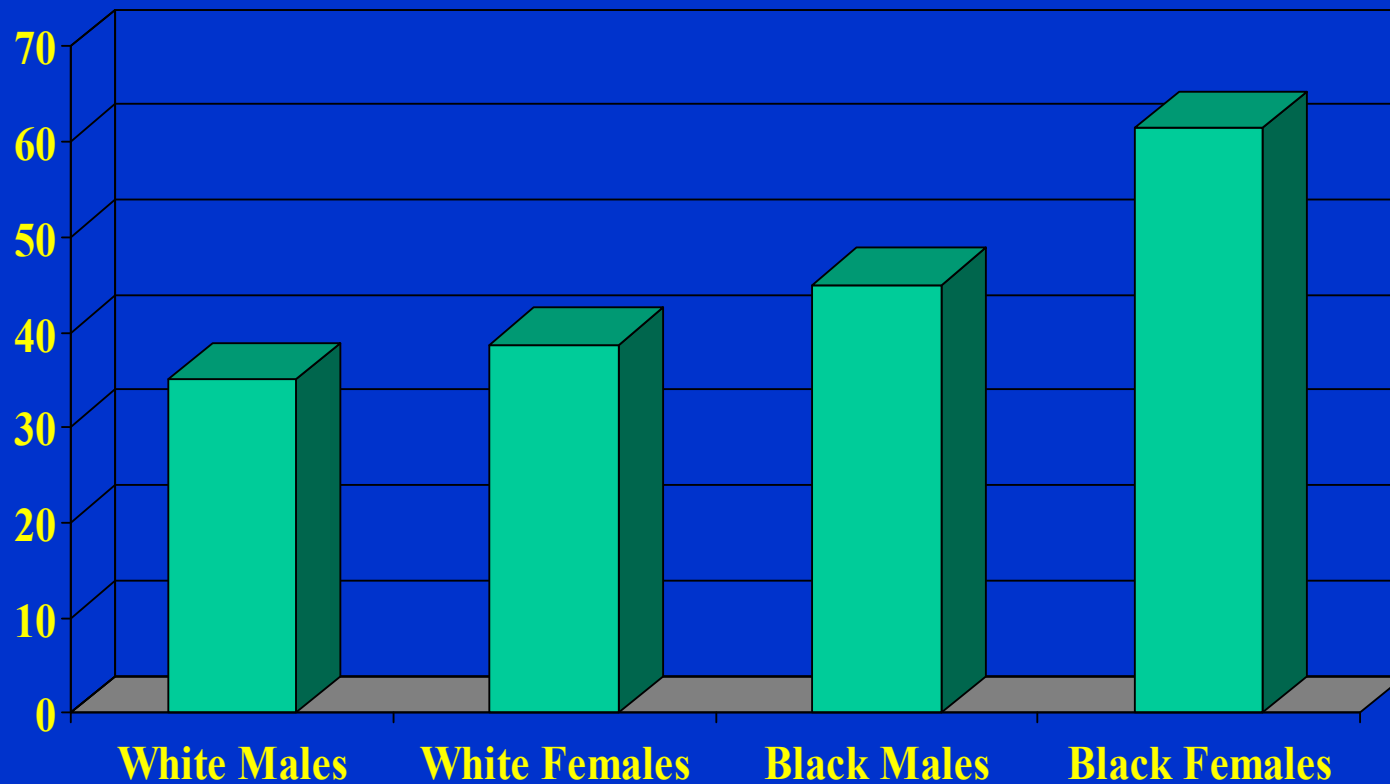
**4-9 mmHg**

## **When you recommend exercise for a 50 year old overweight man**

- A] Aerobic exercise 3 times per week 20 minutes each
- B] Any exercise 5 times per week . 20 minutes each
- C] Daily walking twice a day for 10 minutes each
- D] Any activity for a total of 60 minutes per week



# Sedentary Lifestyle (< 60 minutes per week) SC Adults

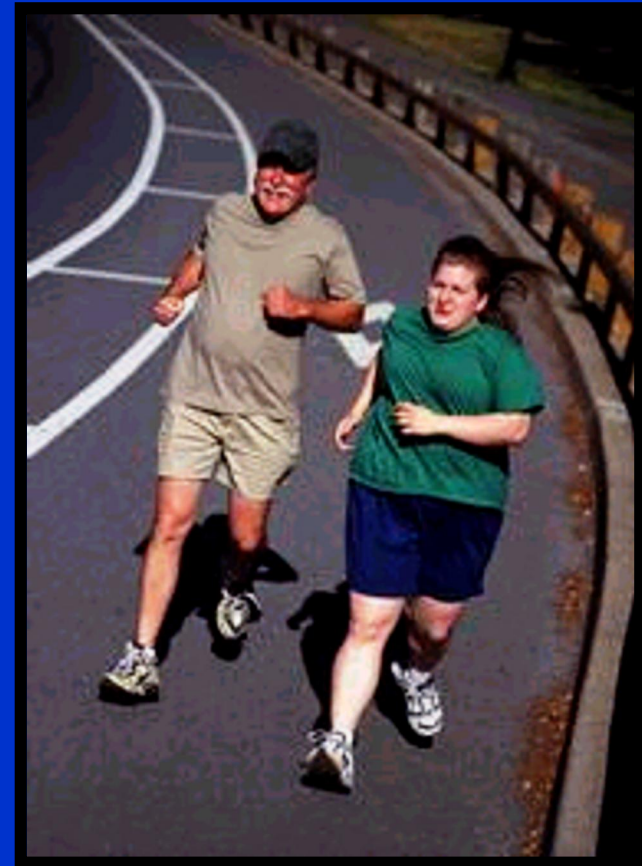


Lackland, 1992

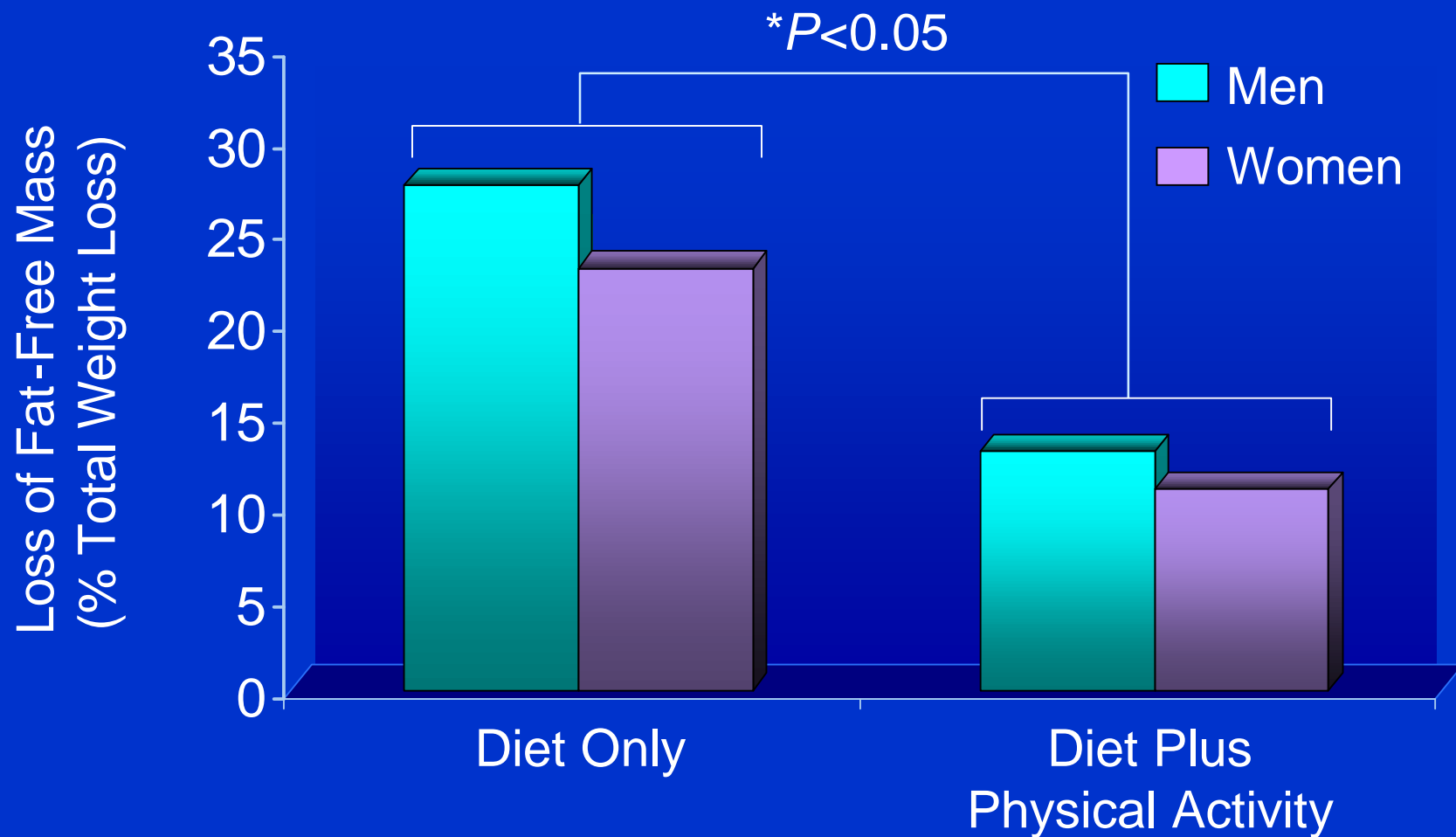
Public Health Rep 1994;109:50-54

# Benefits of Regular Physical Activity in Obese Persons

- Decreases loss of fat-free mass associated with weight loss
- Improves maintenance of weight loss
- Improves cardiovascular and metabolic health, independent of weight loss



# Physical Activity Helps Preserve Fat-Free Mass During Weight Loss



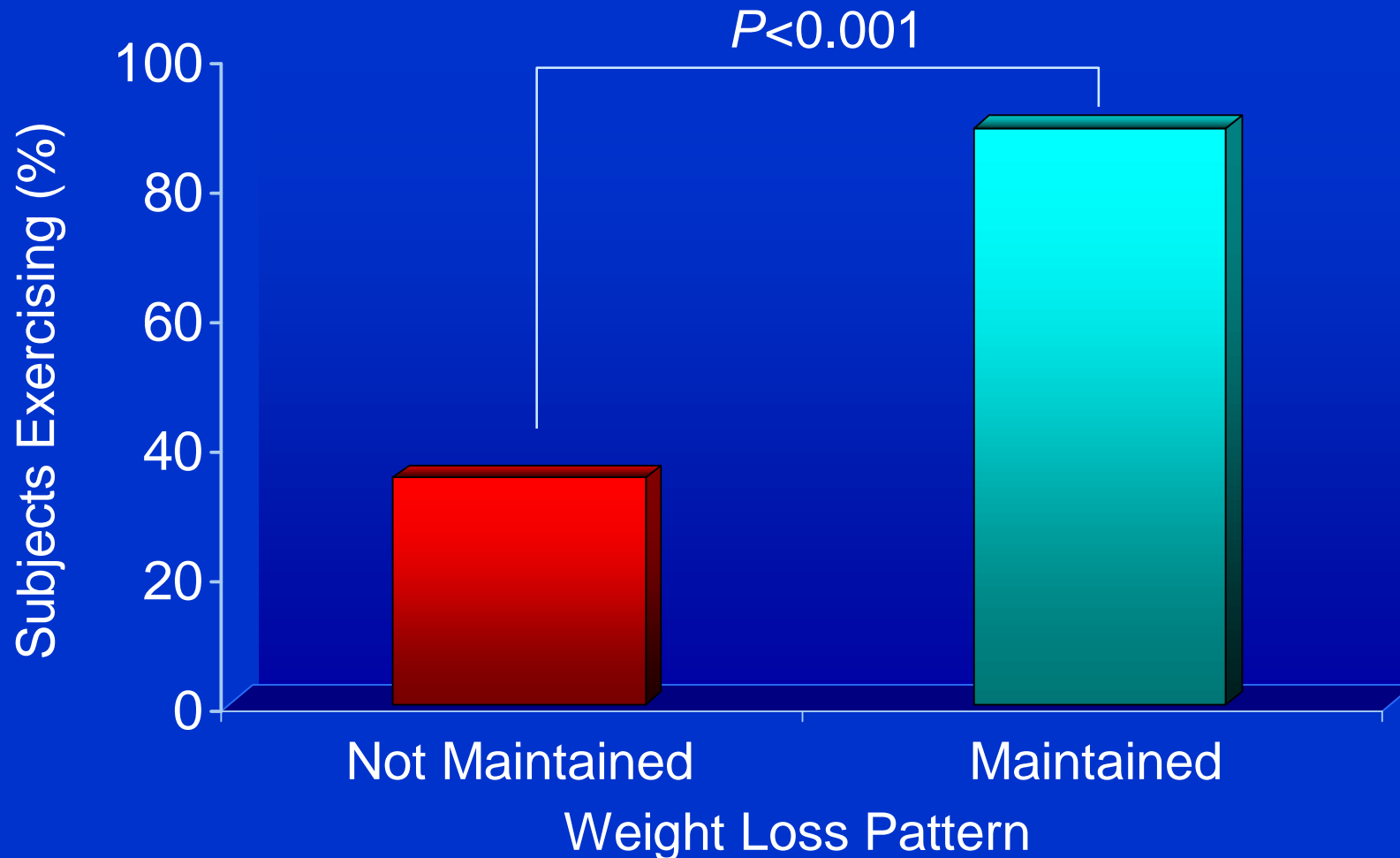
Reprinted with permission from *Int J Obes Relat Metab Disord*, Ballor and Poehlman;18:35. Copyright 1994 Macmillan Publishers Ltd.

# Energy Expenditure of Physical Activity



Adapted from: Alpers. Undergraduate Teaching Project. Nutrition: energy and protein. American Gastroenterological Association, 1978.

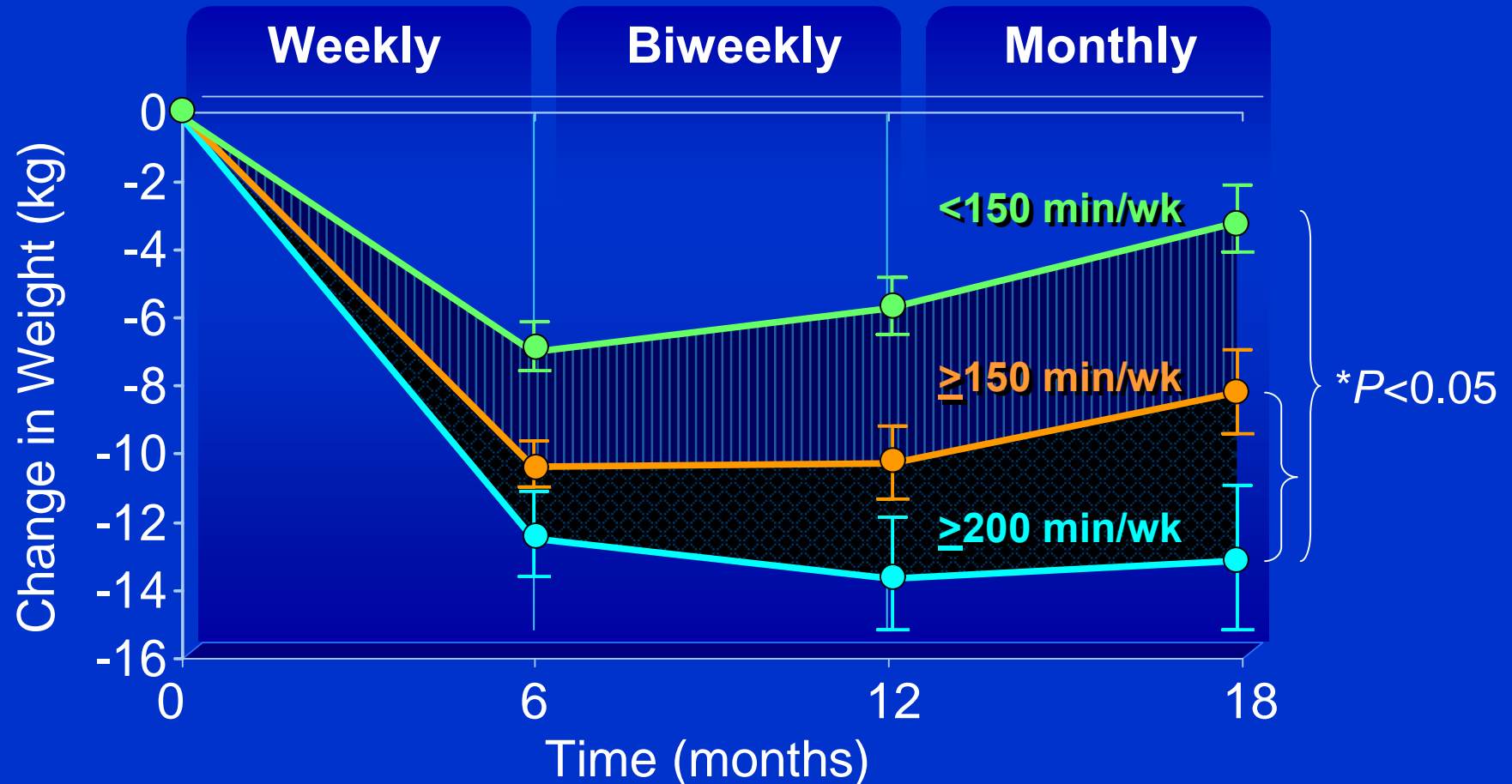
# Relationship Between Physical Activity and Maintenance of Weight Loss



Reprinted with permission by the *American Journal of Clinical Nutrition*. © Am J Clin Nutr. American Society for Clinical Nutrition.

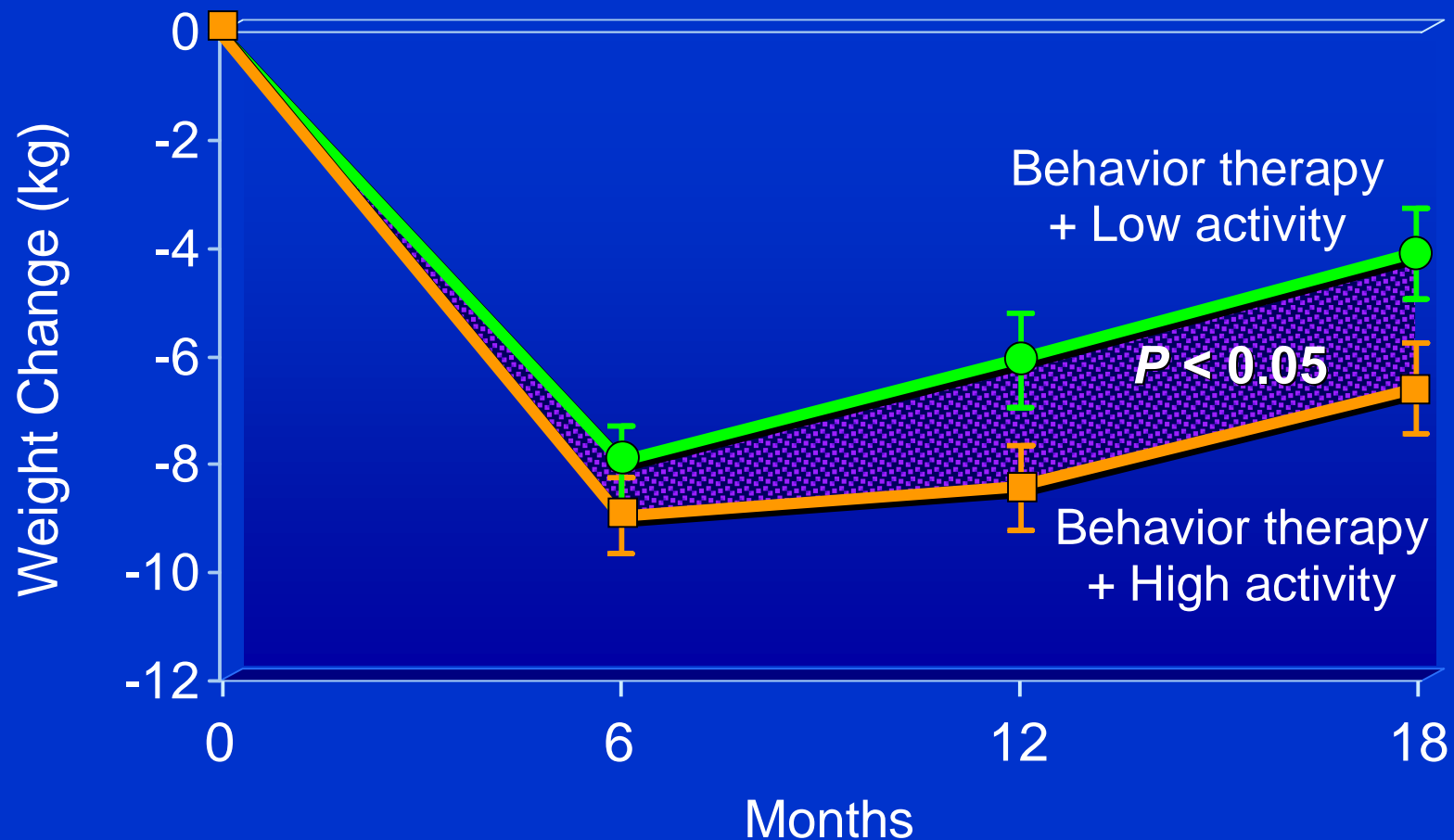
# Considerable Physical Activity is Necessary for Weight Loss Maintenance

## Concomitant Behavior Therapy



Jakicic et al. *JAMA* 1999;282:1554.

## Effect of Low-Activity (1000 kcal/wk) and High-Activity (2500 kcal/wk) on Body Weight



Jeffery et al. Am J Clin Nutr 2003;78:684-689.

# Smoking



## Paradigm Shifts...

113,597 DOCTORS FROM COAST TO COAST WERE ASKED!



According to this recent Nationwide survey:

## MORE DOCTORS SMOKE CAMELS THAN ANY OTHER CIGARETTE!

This is no casual claim. It's an actual fact. Based on the statements of doctors themselves to three nationally known independent research organizations.

THE QUESTION was very simple. One that you...any smoker...might ask a doctor: "What cigarette do you smoke, Doctor?"

After all, doctors are human too. Like you, they smoke for pleasure. Their taste, like yours, enjoys the pleasing flavor of costlier tobaccos. Their throats too appreciate a cool mildness.

And more doctors named Camels than any other cigarette! If you are a Camel smoker, this preference for Camels among physicians and surgeons will not surprise you. But if you are not now smoking Camels, by all means try them. Compare them critically in your "T-Zone" (see right).

CAMEL-COSTLIER TOBACCO

### THE "T-ZONE" TEST WILL TELL YOU

The "T-Zone" is the taste and throat area... it's your own personal guide to the cigarette that gives you the most pleasure... the most throat relief... the most throat comfort. On the basis of the experience of many, many millions of smokers, we believe Camels will give you the "T-Zone" to a "T".



## "GOT A COLD?" THEN IT'S TIME TO CHANGE TO SPUDS



### ENJOY THEIR COOLING SMOOTHNESS AND GIVE YOUR THROAT A REST!

New, improved Spud Imperials are made for a purpose—designed to safeguard your throat from irritation caused by ordinary cigarettes.

#### SPUDS ARE SUPERIOR IN 3 WAYS:

**GREATER SAFETY**—The special moisture-retaining agent used in Spud Imperials does not produce acrolein—a throat irritant found in the smoke of nearly all cigarettes. In addition, Spuds are made 20% longer to give you a cooler, better filtered smoke.

**MILDER MENTHOL**—An exclusive, patented process distributes menthol more mildly and evenly throughout Spuds. No "menthol overloadings!"

**BETTER QUALITY**—Spud Imperials are made of an extremely mild blend of the finest vintage tobaccos—aged to perfect mellowness. No coupons—just high quality tobacco!

Try the new, improved Spud Imperials. Smoke them as long as you like—and by all means change to Spuds when your throat is irritated. It's safer—and you'll get real smoking pleasure. The Astor-Fisher Tobacco Co., Inc. "House of Tradition."



## NOSE or THROAT CONGESTED? IT'S TIME TO CHANGE to SPUDS



### ENJOY THEIR SOOTHING COOLNESS AND GIVE YOUR THROAT A REST!

If a cold is making your head stuffy, your throat tender—making your regular cigarette tasteless or "harsh"—there's a definite common-sense reason why you should change to Spuds. For new, improved Spud Imperials are made for a purpose—designed to protect your throat from irritation caused by ordinary cigarettes.

#### SPUDS ARE SUPERIOR IN 3 WAYS:

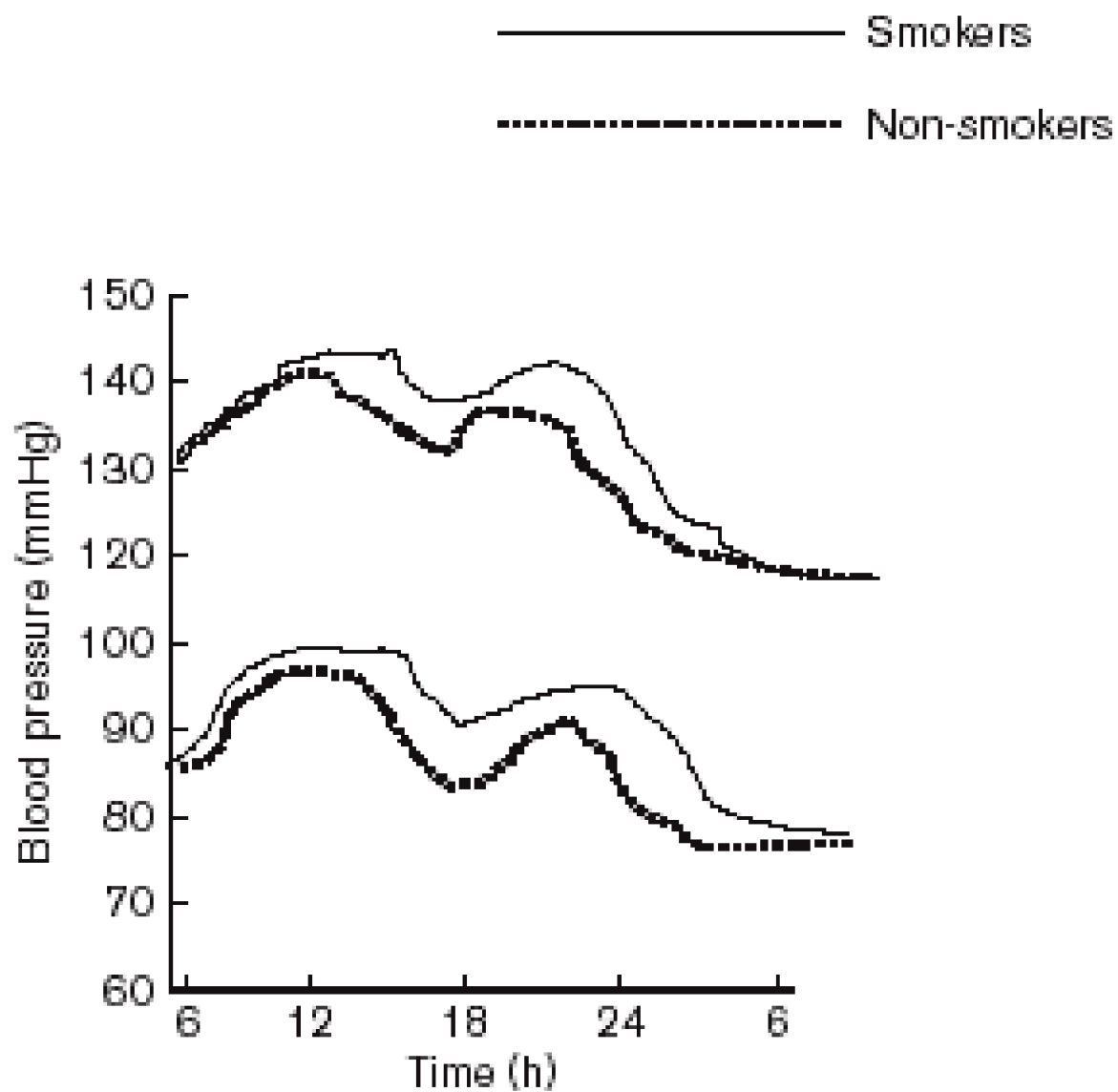
**GREATER SAFETY**—The special moisture-retaining agent used in Spud Imperials does not produce acrolein—a throat irritant found in the smoke of nearly all cigarettes. In addition, Spuds are made 20% longer to give you a cooler, better filtered smoke.

**MILDER MENTHOL**—An exclusive, patented process distributes menthol more mildly and evenly throughout Spuds. No "menthol overloadings!"

**BETTER QUALITY**—Spud Imperials are made of an extremely mild blend of the finest vintage tobaccos—aged to perfect mellowness. No coupons—just high quality tobacco!

Try the new, improved Spud Imperials. Smoke them as long as you like—and by all means change to Spuds when your throat is irritated. It's safer—and you'll get real smoking pleasure. The Astor-Fisher Tobacco Co., Inc. "House of Tradition."





24-h blood pressure monitoring curves in smokers and non-smokers.



20 CLASS A  
CIGARETTES

